XXI.—COMPENSATION PENDULUM.

The Sum of Five Pounds *was this Session given to Mr.* Adam Reid, *of Green End, Woolwich, for his* Compensation Pendulum; *a Model of which has been placed in the Society's Repository.*

In the year 1818 a reward was given to Mr. Reid, for a Compensation Pendulum, in which the bob rested on a hollow cylinder of zinc, through which the rounded end *b c* of the steel pendulum rod A passed, the zinc itself being supported by the nut *e* at the end of the rod. As, therefore, the rod lengthened by heat, carrying the bob downwards, so the upward expansion of the zinc raised the bob; and if the relative lengths of the steel and zinc were so proportioned that the amount of their expansions was equal, it is evident that the compensation above described would be perfect.

But it is extremely difficult to effect this accurate proportioning of the lengths of the two metals. The length of the zinc, at first, must be such, that its rate of expansion shall be in excess, and it must be cautiously reduced by repeated trials, till the requisite accuracy is attained; this, however, is not done, except at a considerable expense of time and attention, to avoid which, Mr. Reid has introduced the following modification. He forms a hollow screw in the cross-bar *f* of the bob *g*, and an external screw of the same rake on the end of the zinc cylinder *d;* this latter is purposely made too long for due compensation, but its effective length may be commodiously and accurately reduced to what is required, by screwing it up as represented in the figure. But, after this has been done, supposing the nut *e* to have

remained stationary, it is evident that the center of gravity of the pendulum itself will have been lowered by the bob descending exactly as much as the upper end of the cylinder has advanced through the hole in the cross-bar *f*; an adjustment for time is therefore required after that for compensation has been effected, which is done in the usual way, by screwing up the nut *e*. This latter compensation, however, will not be required, if the rakes of the screws *f* and *c* are proportioned to each other as the weight of the bob alone is to the sum of the weights of the bob, the zinc cylinder, and the nut. Thus, if the former weight be assumed as ten, and the latter as eleven, the screw at *f* must have ten threads in the same length that the screw at *c* has eleven threads. Care must be taken in screwing the cylinder of zinc up or down, to place the finger and thumb at the same time on the nut, so that the two may turn together; or the nut may be fastened to the cylinder.